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FINANCIAL DERIVATIVES : FUTURES

THE BIG PICTURE SIMPLY EXPLAINED

LEVERAGING THE POWER OF BIG DATA FOR SAFEGUARDING FINANCIAL MARKETS

FINANCIAL MARKETS VOLUME EBULLIENCE : MAKING THE CASE FOR A TONED DOWN MARKET ACTIVITY

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Financial Derivatives Futures: The Big Picture Simply Explained

ABOUT -

This post aims to explain the fundamental concept of Financial Derivatives: Futures using illustrative examples. It does so without plunging into intricacies and with minimal use of technical terms. Focusing on the big picture, it explains the working mechanism of Futures and also explains why Futures Market & the Derivatives Market in general is called a Zero-Sum game.

Let us begin with some definitions. A futures contract is a standardized agreement between a buyer and a seller to exchange an amount and grade of an item at a specific price and future date. The item or underlying asset may be an agricultural commodity, a metal, mineral or energy commodity, a financial instrument or a foreign currency. Because futures contracts are derived from these underlying assets, they belong to a family of financial instruments called Derivatives.
Derivatives are financial instruments whose values depend on the value of other underlying financial instruments. The main types of derivatives are futures, forwards, options and swaps.

Generally speaking, to hedge is to take opposing positions in the futures and cash markets. Hedgers include farmers, merchants, millers, utilities and commodities export and import firms, refiners, lenders, hedge fund managers and so on. Meanwhile, to speculate is to take a position in the futures market with no counter-position in the cash market. Speculators may not be affiliated with the underlying cash markets.

Futures markets enable hedgers to shift price risk – asset price volatility – to speculators in return for basis risk – changes in the difference between a futures price and the cash, or current spot price of the underlying asset. Because basis risk is typically less than asset price risk, the financial community views hedging as a form of risk management and speculating as a form of risk taking.

Speculators make the hedge possible because they absorb the inventory's price risk; for example, the ultimate counter-party to the inventory dealer's short position is a speculator.

Consider an example-

'Trader A' and 'Trader D' wish to enter into a Futures contract having opposite views on the Future price of a certain asset. Trader A believes the price of that asset would increase over a month's period whereas Trader D holds a contrary view. Therefore Trader A chooses to enter into an agreement with Trader D, whereby it's agreed that Trader A is entitled to buy the agreed upon asset from Trader D at current market price at the specific future date -i.e. at Futures expiry. If at that specific future date the Market price of that agreed upon asset has indeed increased, Trader A stands to gain since Trader A is entitled to purchase that asset at the older lesser market price at which Trader A entered into a futures contract; whereas Trader D losses as he is obligated to sell the asset at a lower price than it's actual market price.

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However if after a months period the price of that asset decreases then Trader D stands to gain as Trader A is obligated to purchase the asset from Trader D at a price higher that it's actual market price.

That means if Trader A's judgement of asset price is correct Trader A 'gains' at the cost of Trader D's 'loss'. Similarly, If Trader D's speculation happen to be right Trader D gains at Trader A's cost. If the future price remains unchanged it's a 'no profit no loss' situation for both.

Another way to write this- Say current market price of asset is Rs.5 thousand. A goes long [Buyer]- D goes short[Seller]- 'A' buys from 'D'. A buys at 5k while D sells at 5k. At futures expiry their positions will have to be squared of. At Futures expiry the Futures price and the underlying price of that asset would converge, it is against this price that the open positions of transacting parties would be squared off. If the market price of that asset at futures expiry happens to be 6k. A's position would be squared of-sold at 6k.[Sell price – Buy price = 6k-5k = +1k i.e Trader A has made a profit of 1k.]Since D had initially shorted [Sold] hence for squaring off D's position asset would be purchased at Futures expiry price[Final Price] [Sell price – Buy price = 5k – 6k = -1k i.e. Trader D has made a loss of 1k]. Total of all profits and losses is a Zero.

So, what is a zero-sum game? Zero-sum is a situation in game theory in which one person's gain is equivalent to another's loss, so the net change in wealth or benefit is zero. A zero-sum game may have as few as two players, or millions of participants. For every party who gains on a contract, there is a counter-party who loses.

Consider another example of a Futures contract- [a simple example with just 8 participants- low liquidity]

At the start of the trading session A and D enter into a futures contract -refer to the figure below .A buys from D at price Rs 5. last traded price[LTP]for now. Assume no other transaction took place for this asset's futures contract for the day. LTP is 5 for the day. After a day P and Q enter into a futures contract. P-Buyer, Q-Seller at price Rs 6. Please refer to the diagram & table for the entire transaction sequence. The figure on the following page is self-explanatory.

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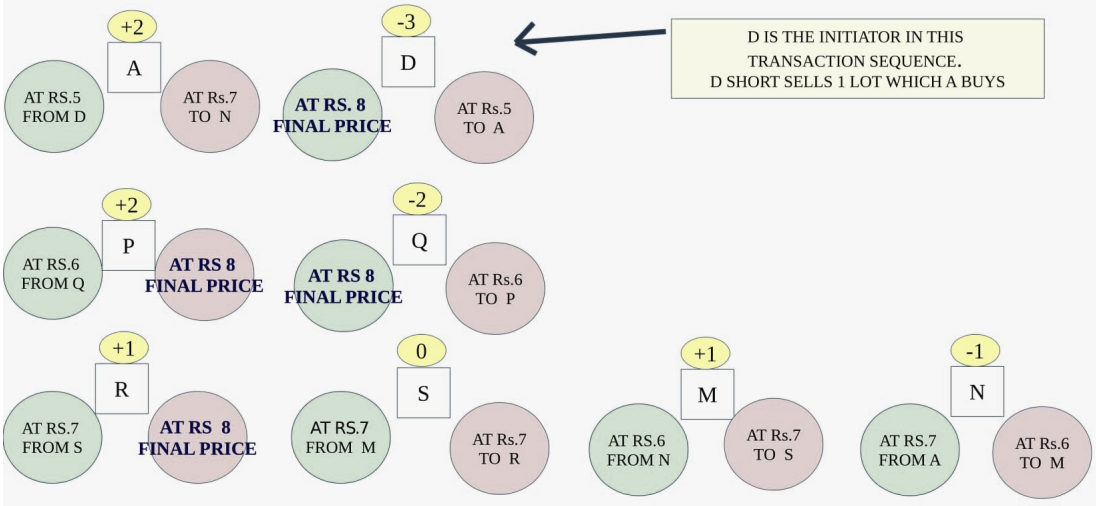
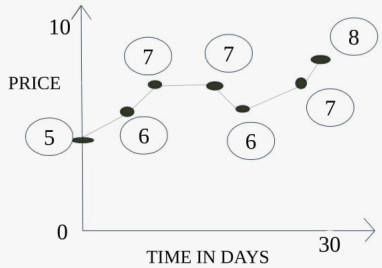
FINANCIAL DERIVATIVES: FUTURES- EXAMPLE TO SHOW WORKING MECHANISM

TRANSACTION NO <Sequence>	TRANSACTING PARTIES	PRICE	QUANTITY<kept constant for simplicity>
1	A-BUYER D-SELLER	5	1 LOT
2	P-BUYER Q-SELLER	6	1 LOT
3	R-BUYER S-SELLER	7	1 LOT
4	S-BUYER M-SELLER	7	1 LOT
5	M-BUYER N-SELLER	6	1 LOT
6	N-BUYER A-SELLER	7	1 LOT



TOTAL OF ALL PROFITS AND LOSSES = (+2) + (-3) + (+2) +(-2) + (+1) +(0) + (+1) +(-1) = 0
TOTAL OF ALL PROFITS OF ALL GAINERS= (+2) + (+2) + (+1) +(+1) = (+6)
TOTAL OF ALL LOSSES OF ALL LOSERS= (-3) +(-2) +(-1) = (-6)



A SIMPLE FUTURES CONTRACT OF A MONTHS DURATION WITH ONLY 8 PARTICIPANTS. 6 TRANSACTIONS EXECUTED BY PARTICIPANTS + 4 TRANSACTIONS EXECUTED AT EXPIRY OF CONTRACT AS PART OF SETTLEMENT MECHANISM FOR- D,P,Q AND R

GREEN ELLIPSE INDICATES **BUY**

RED ELLIPSE INDICATES **SELL**

+/- INDICATES PROFIT OR LOSS.+VE VALUE FOR PROFIT & -VE VALUE FOR LOSS

EX: PRICE CHART FOR 'XYZ COMPANY' FUTURES CONTRACT OF ABOVE EXAMPLE

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The final price-settlement price at futures expiry at the end of the month happens to be Rs. 8. Hence all open positions would be squared off against that. A,S,M and N have already squared off their positions prior to expiry hence only positions of D,P,Q and R would be squared off.

CONCLUDING NOTES -

After understanding the above example it shouldn't be difficult to see that the game remains a zero-sum game even if thousands of participants participate and number of transactions increase.

It shouldn't also be difficult to see that the game still remains a zero-sum game if the traded quantities per participant are made variable. So also it is easier to see that forwards contracts and options too are zero-sum games – excluding transaction costs/taxes, else they are negative-sum games.

Intra-day trading- excluding delivery trades [i.e.- trades with actual delivery of the security] is another example of a zero-sum game of a single day duration. The sum of multiple zero-sum games still remains a zero-sum game. Futures market also allows intraday trades. So it's akin to multiple smaller zero-sum games embedded in a larger purely zero-sum game.
That is the reason why the Futures Market & the Derivatives Market in general is called a Zero-Sum game. There are other aspects to this zero-sum game which shall be discussed in subsequent posts.

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Leveraging the power of "Big Data" for safeguarding financial markets

Big Data | Analytics | AI | Machine learning

The ability to access, manage and tap into "Big Data" has opened up numerous possibilities in the field of the financial markets. Today it is a business imperative and is providing solutions to long-standing business challenges for banking and financial markets companies around the world. Millions of transactions are executed every single trading day on major Indian stock exchanges generating brobdingnagion volumes of data. Hitherto unimaginable large scale data analysis and the resultant accessibility to multi-dimensional insights hold the potency to completely revolutionize the industry and ways in which it operates. Big data technology has brought within reach super fast data processing ability and real time revelations based on analytics making previously obscure and high cost undertakings feasible. Particularly in case of the financial markets, with no physical products to manufacture 'Data' - the source of information is one of the most important assets.

In the recent years electronic trading has become the norm in the securities market. Practices such as High Frequency Trading (HFT) and Algorithmic trading (algo - trading) are also quite common. When the trading mechanisms are rapidly becoming high tech it's crucial for market regulatory practices to follow suit in order to remain relevant.

Big data itself does not create value, until it is put to use to address important business challenges. This requires access to more and different kinds of data, as well as strong analytics capabilities that include not only the tools, but the requisite skills to use them.

The need for more advanced data visualization and analytics capabilities increases with the introduction of big data. Datasets are often too large for business or data analysts to view and analyse with basic data mining. Integrating a variety of data types and analysing streaming data often require new infrastructure components, like Hadoop, analytic softwares, real-time streaming and visualization, to name just a few. A technological overhaul would be of great help.

Features of such systems would include *-

• Such systems would provide a platform that can procure data from tens of millions to billions of market events (spanning a range of financial instruments – Equities, Bonds, Forex, Commodities and Derivatives etc) on a daily basis from thousands of institutional market participants. Data can be ingested using a range of tools – Sqoop, Kafka, Flume etc.

* REFER TO THE COMPLETE ARTICLE FOR A COMPREHENSIVE LIST

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• Such systems would be capable of detecting market manipulation, insider trading, watch/restricted list trading, excessive speculatory activity in derivatives market and unusual pricing. Multifaceted projects such as Apache Spark that allow users to perform exploratory data analysis (EDA), data science based analysis using language bindings with open source languages like Python & R etc. for a range of investigate use-cases may be used.

• A wide range of Analytical tools integrated with the system that allow the best dashboards and visualizations supporting platforms like Tableau, Qlikview etc could be used for real time monitoring.

Big data has radically changed the functioning of each and every arm of the financial markets be it the ability to efficiently store enormous amounts of heterogeneous trade data, ability to perform Realtime Surveillance & Monitoring of data or Machine Learning & Predictive Analytics capabilities. And putting them to the best of their use by timely detection of illegal trading patterns and practices. For instance- NYSE Euronext a prominent stock exchange company employed big data analytics to detect new patterns of illegal trading. It implanted a new markets surveillance platform that both sped up and simplified the processes by which its experts analysed patterns within billions of trades.

The system currently is approximated to process data in excess of ten petabytes a day. In the Indian context consider this very practical application—Pragmatists may notice that the trading volumes of the major stock exchanges of India are unwarrantably huge especially in the derivatives segment. Technically such a situation is discrepant in a market(derivatives) which inherently is a zero-sum game. Big data technology can be leveraged to the best of it's potential to figure out the details and underlying causes.

CONCLUDING NOTES -

The development of computational data science techniques in natural language processing (NLP) and machine learning (ML) algorithms to analyze large and complex textual information opens new avenues to study intricate processes at a scale unimaginable even a few years ago. Financial market trading firms are highly reliant on technology for business, but it is also increasingly necessary for them in meeting the regulatory requirements that govern the market. Regulation is expected to become even more complex and having the right systems in place will be key.

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Financial Markets Volume Ebullience

Making the case for a toned down market activity

OVERVIEW -
• Context of Indian financial markets • Hedger activity • Role of the speculator • Role of financial derivatives • Role of financial markets • Discrepancies in derivatives market & the impact • Markets auto-balancing mechanics • Call to action

The recent past has witnessed tremendous growth of the Indian securities market, the financial derivatives market included. While celebrating this fact it is also pertinent to bear in mind the market fundamentals that underlie and their resultant capacities and limitations. In the context of the derivatives market which inherently is a zero-sum game such exuberance may not be justified. Juxtaposing 'winner' and 'loser' statuses in a derivatives market reveals a perfect equilibrium - 'gain-loss parity', an equilibrium that embeds disequilibrium of gains. The vastly baffling world of the derivatives market and allied financial instruments easily dissuades one from attempting to define the contours of its functioning. In this article I make the case for a toned down market in the context of the derivatives market and present a logical justification for it.

Let us consider the case of the derivatives market. The derivatives market activity is fueled by hedger-speculator activity along with arbitrageurs. By definition, hedgers are those who have opposing positions in the futures market and the cash market for the same underlying security/assets. Hedgers hold instruments to offset correlated risks in other activities. Hedger's position in the futures market offsets the profit or loss made against its corresponding position in the cash market. A profit in the cash market implicates loss in the futures market, such that losses countervail profits. For the individual hedger it's always a ' no profit no loss' situation, apart from transaction charges, no matter how the market moves. This is also the reason why individuals hedge securities held by them in times of extreme market volatility or ex ante uncertainties.
Although hedgers are protected from any losses per se, they are also restricted from any gains owing to their hedging activity. Therefore, since a loss in the futures market of a hedger is counterbalanced by a profit in the spot market, the hedger isn't very likely to treat the loss borne in the futures market purely as a loss.

Consistent losses in the futures market may however deter the hedger from hedging as the perspective might then change to avoiding passing over gain making opportunities in the spot market which as a consequence would lead to restricted and constrained hedging activity. That said there are circumstances where hedging becomes more of a necessity and an optimality.
In such events the role played by the speculator becomes vital.

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Speculators are people who analyse and forecast futures price movement, trading contracts with the hope of making a profit. Speculators make bets or guesses on where they believe the market is headed. For example, if a speculator believes that a stock is overpriced, he or she may short sell the stock and wait for the price of the stock to decline, at which point he or she will buy back the stock and receive a profit. Speculators are vulnerable to both the downside and upside of the market; therefore, speculation can be extremely risky.

While they put their money at risk, they won't do so without first trying to determine to the best of their ability whether prices are moving up or down. Speculators analyse the market and forecast futures price movement as best they can. They may engage in the study of the external events that affect price movement or apply historical price movement patterns to the current market. In any case, the smart speculator doesn't operate blindly. The main purpose of speculation, is to profit from betting on the direction in which an asset will be moving.

Speculators assume risk for hedgers. Speculators accept risk in the futures markets, trying to profit from price changes. Hedgers use the futures markets to avoid risk, protecting themselves against price changes. This is the ideal situation also the reason why derivatives as market products were invented in the first place.

There's a futures contract for a commodity or financial product because there are people who conduct an active business in that commodity. For example, there's a cotton futures contract because there are cotton producers who sell cotton and companies that buy cotton. The hedger plans to buy (sell) a commodity, such as cotton, and buys (sells) a futures contract to lock in a price and protect against rising (falling) prices. The need for risk management that futures can meet holds true for all markets, including financial markets. Internationally, companies hedge their foreign exchange and interest rate exposures. Similarly, hedge-fund managers hedge stock fund risk.

One of the major functions of the financial markets is to convey appropriate price signals to the economy. There is a social value of price discovery. A market economy could not function in the absence of prices, but that doesn't entail beneficialness of more price discovery or excessive non required liquidity. Market manipulation, front running and such other malpractices that lead to loss of confidence in the markets still loom large. They enhance the powers of certain market players to manipulate the market for at least as long as the market doesn't figure it out. But even if the distortion in the market is limited, costs can be imposed on others in their attempt to decipher how the market might be manipulated. Again, attention is diverted away from understanding the fundamentals of the economy—to acquiring information that might make the economy perform better and more efficiently.

Any digression from the ideal situation, possibilities of which abound, would lead to an interesting scenario—where the number of speculators exceeds the number of hedgers hugely.

The speculators would end up trading among themselves when the above scenario builds up. In such case the very nature of the derivatives market would fetter such activities and bring down the level of both the excessive speculating activity and the number of speculators to an optimum.

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Here's a brief explanation why (considering the Futures market as an instance) -

As with all zero-sum games, in futures market it all boils down to the 'Winners' and the 'Losers' at the Futures expiry. Futures price and underlying price of the security converge and the total of all profits gained by Gainers equals the total of all losses incurred by Losers.

If today's Gainers—institutions or individuals—are to be tomorrow's Losers (institutions or individuals) and vice versa, it makes it a zero-sum game for all; but if professional/consistent 'Winners' are to continue to win then 'Losers' have to continue to lose. More often than not losers would quit trading post a series of losses/zero-sums making it impossible for 'Winners' to win. No Losers would mean no Gainers.

Rate at which market can replenish losers in equal capacity of lost numbers, money flows and volumes is quite limited. Popular reasons for market participation such as saving, portfolio re-balancing, investment or making money from markets do not justify the observed level of trading activity- the huge volumes.

Professional trading institutions may well be aware of the zero-sum nature of the markets & would only enter when they have an edge over others. Apparently, equal no of losers are to be expected in terms of money flows, volumes et al.

Laymen investors/traders tend to be (as also are advised to be) cautious in putting money into the markets thus restricting profits that can be made by professionals.

Taking cognizance of the above facts, one can conclude it is the very nature of the zerosum part of the market game to practically not allow for huge volumes or continued market participation of all of its market participants especially the non–gainers.

Interestingly, if the above scenario (i.e. the disproportionate rise in number of speculators as compared to hedgers) builds up it would automatically make sure consistently losing/non-gaining parties quit.

It's questionable, however, if that doesn't happen i.e. if number of speculators is not automatically brought under check—and if it remains to be the case for extended periods of time. Unless one was to exclude altogether any monetary incentive for market participation—making the source of market funding hazy, which in itself insinuates a possible market manipulation.

CALL TO ACTION -

Every other factor accounted for, it is still not possible for the derivatives market to sustain itself with disproportionately huge volumes—its very nature (zero-sum) does not allow that. Technically, such discrepant situation is not possible without a maneuver. The market regulators ought to dig into the details and causes of such discrepancies. Such huge volumes have no associated quantifiable value, at least not for the sake of social welfare or for the interest of fair and equitable functioning of the markets. It's time the markets tone down their ebullience for good.

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